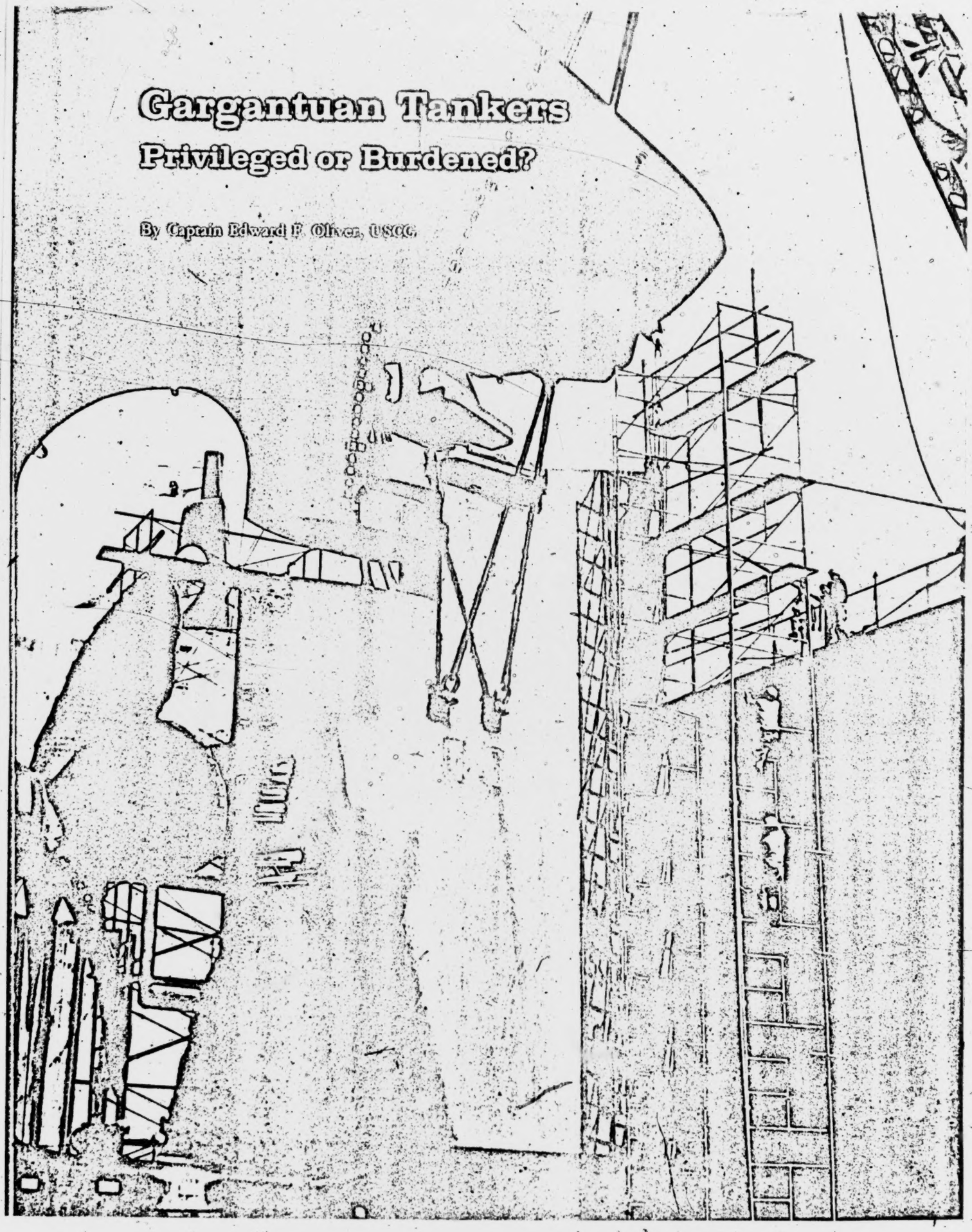
Gargantuan Tankers

Privileged or Burdened?

By Captain Edward F. Oliver, USCG



The tragic breakup of the *Torrey Canyon* on the jagged rocks of Seven Sisters Reef on 18 March 1967, focused the attention of the world for the first time on the immense size of modern tankers. Today, the 119,000-ton *Torrey Canyon* seems almost small.

Following the *Torrey Canyon* debacle, the world began to understand that the potential damage from a collision or stranding of a multimillion-barrel oil tanker was not acceptable. The Santa Barbara Channel disaster, for example, where 241,000 gallons (7,650 barrels) escaped from a broken casing, would be insignificant compared to a similar accident involving a tanker that could carry 3,000,000 barrels.

Only by international action can such a situation be met effectively. The international character of much of today's shipping is well illustrated by the *Torrey Canyon* herself. Built in Japan, she was owned in Bermuda, registered in Liberia, sailed under an Italian master and crew, was on charter to a British Corporation, and was contracted for salvage to a Dutch company.

Since 1955, the title "world's largest tanker" has been claimed for eight different ships, one holding the honor for only seven days. The following list illustrates the rapid growth of tankers within the past few years:

Name	*Tons*	*Built*	*Launched*
Sinclair Petrolore	56,089	Japan	1956
Universe Leader	85,515	Japan	1957
Universe Apollo	104,520	Japan	1959
Manhattan	108,590	USA	1962
Nissho Maru	130,250	Japan	1962
Tokyo Maru	130,250	Japan	1966
Idemitsu Maru	206,000	Japan	1966
Universe Ireland	326,000	Japan	1968

The title of "largest ship in the world" is now shared by the Bantry Bay class tankers, six sister ships, all 326,000-ton behemoths. The *Universe Ireland*, first to be launched, was built at a cost of $20,000,000 at the Ishikawajima-Harima Heavy Industries Shipyard in Yokohama and was launched in March 1968. The six gargantuan vessels, all owned by National Bulk Carriers and under long-term charter to Gulf Oil Corporation, can each carry 2,513,588 barrels of oil. They are 1,135 feet long.

The *Universe Ireland* and her sisters will not share the title of the world's largest ships for long. There are plans for a 1,000,000-ton tanker on the drawing boards. She will measure approximately 2,000 feet in length, will have a beam of 300 feet, and a draft of 100 feet. Today, under construction, or on order, are 58 100,000-tonners, 191 200,000-tonners, 11 300,000-tonners, and one ship of over 400,000 tons.

The world trend toward giant tankers was accelerated by uncertainties over Suez. Europe, whose oil needs have tripled since 1956, imports nearly all of the oil it uses, and more than 50% of these imports come from the Middle East.

The gargantuan tanker's huge capacity makes it economical for such a ship to bypass the blocked Suez and plow through 11,000 miles of ocean around Cape of Good Hope from the Middle East to Europe and the Americas. The transportation costs run to 40 cents per barrel in a 200,000-ton ship compared with 52 cents in a 70,000-tonner. Each of these leviathans can save a company $1,000,000 a year in shipping costs.

The biggest single restricting factor in tanker development has been, and will continue to be, draft, which until recently was governed mainly by port and approach channel considerations. However, because of the ever-growing size of the tankers and the widening number of places they serve, the limiting depth of narrow ocean passages, such as the Straits of Dover and Malacca, now must be taken into consideration.

As an example of how draft has increased, a World War II T-2 tanker of 17,000 tons, with a length of 523 feet, has a draft of about 30 feet. A 200,000-tonner with the same proportions draws 60 feet.

Navigation of the Panama and Suez Canals is not possible by ships larger than 80,000 tons owing to the channel depths of 38 feet and 38 feet 6 inches, respectively. Prior to the Arab-Israeli war, however, Egyptian authorities had announced plans to deepen the Suez to 60 feet by 1975 to accommodate 200,000-tonners.

There are only 20 ports in the world—and only one of them, Long Beach, California, is in the United States—that can accommodate the gargantuan tankers' extreme draft. The other ports are Bantry Bay, Ireland; Finnart and Milford Haven in Great Britain; Rotterdam, Netherlands; La Skhirra, Tunisia; Port de Bouc, France; Haifa, Israel; Mena Al-Ahmadi and Kharg Island, the Persian Gulf; Marsa el Brega, Libya; Las Palmas, Africa; Dumai, Sungai, and Pakning, Indonesia; and Chiba, Tokuyama, Shimotsu, Negishi, and Iwakuni, Japan.

Because of the limited number of accessible ports, the emphasis now is on the development of complete transportation systems, including deepwater, offshore loading and unloading platforms. This, in turn, will mean that most of these huge bulk carriers will never come to a dock during their entire commercial career, except for drydocking.

The first of these transshipping terminals is Bantry

The Idemitsu Maru, *on the preceding page, with a rudder the size of a badminton court, was the largest ship in the world in 1966. Today, she is the seventh largest and, before the 1970s are out, she may not rank in the top 25.*

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Bay Terminal, on Whiddy Island, Eire. The dock there will accommodate a 100,000-tonner and a 300,000-tonner simultaneously.

The U. S. Army Engineers studied the possibility of deepening the Delaware Bay to 50 feet as far as Philadelphia so that giant tankers could be handled, but found that the cost was prohibitive. Sinclair, Cities Service, and Gulf oil companies have announced their intention to build jointly a deepwater terminal inside the entrance to Delaware Bay. Vessels, up to 200,000 tons will discharge all or part of their cargoes at the terminal and either depart seaward in ballast, or continue up river at reduced draft to discharge the balance of the cargo.

The extreme draft of the monster tankers has one compensating feature. Because of the limited maneuvering capabilities of these ships and the distance required for them to stop, their draft precludes navigation in congested and restricted inland waters. Since collision statistics show that only 9% of collisions occur in open waters, this factor may indicate an excellent potential safety record.

The most important factor in connection with collision and stranding—the two most dreaded casualties that can occur to a ship—is the "crash stop" ability. Unfortunately, the ability of the mammoth tankers to come to a "crash stop," as compared with smaller vessels, has decreased as their size has increased.

The momentum and inertia generated by a 326,000-ton giant moving through the water have never been duplicated before and seem almost beyond comprehension. Although there has been an enormous increase in the size of the tankers, their speed has remained fairly constant—15 to 17 knots—the same as that of T-2 tankers. Since the energy to be absorbed in stopping a ship is directly proportional to her displacement, the distance and time required to bring one to a "crash stop" from full ahead has increased tremendously.

While a T-2 tanker of 17,000 tons can come to a "crash stop" within 0.5 mile in 5 minutes, the straight line stopping distance for the 200,000-ton *Idemitsu Maru* is approximately 2.5 miles (10 to 15 ship lengths) and takes 21 minutes. By extrapolation for the 400,000-tonner on order, the straight-line stopping distance for a "crash stop" would be four to five miles, and would take approximately 30 minutes. During this period of backing full, the ship's master is unable to steer her or regulate the speed.

If the engines are not put "full astern" but on "stop," it takes up to one hour for the *Universe Ireland* to run her way off and come to a stop. This means that the mariners who will navigate these ships must exercise a much higher degree of vigilance, and be able to project themselves ahead mentally in time and distance in order to anticipate the next maneuver.

One of the important ramifications of the inability

Having completed his tests of piping, a Japanese shipyard inspector must make a 105-foot-high climb in order to get out of the center cargo tank of the Universe Ireland.

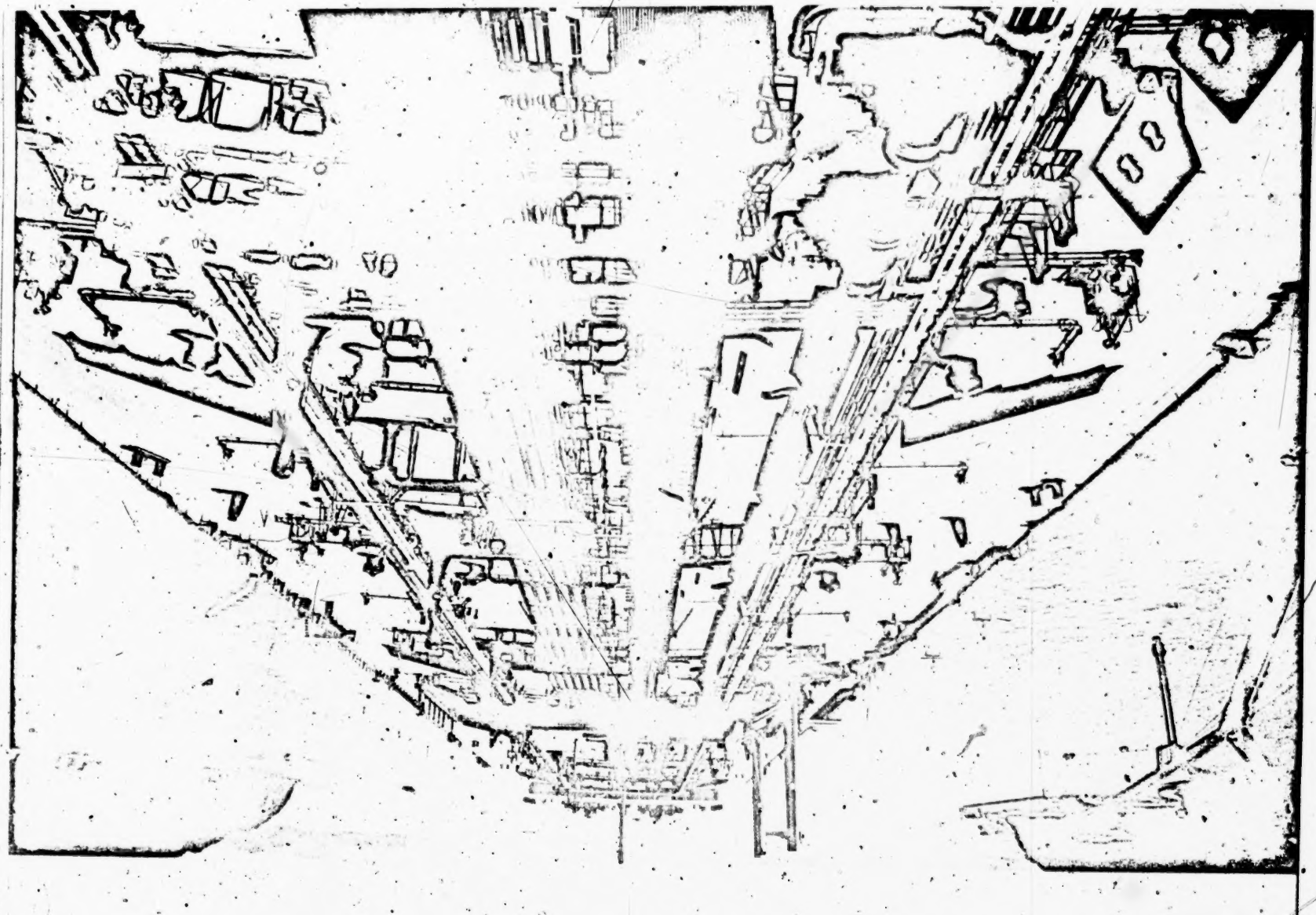
to stop within a reasonably short distance is that the monster tankers cannot operate today within the restrictions established by the International Rules of the Road to prevent collisions.

Rule 16, for example, states: *Every vessel, or seaplane when taxiing on the water, shall, in fog, mist, falling snow, heavy rainstorms or any other condition similarly restricting visibility, go at a moderate speed, having careful regard to the existing circumstances and conditions.* Admiralty courts have long held that "moderate speed" is the speed at which a vessel can stop within one half the distance of visibility. Since a gargantuan tanker cannot be maneuvered readily when moving at less than 5 knots, and cannot be stopped in less than two to three miles, the inability of such ships to comply with this Rule becomes apparent. To comply would mean that the tanker leviathans would have to come to a stop whenever the visibility decreased to less than five miles.

Rule 25, or the *Narrow Channel Rule*, presents another problem for giant tankers. Part (c) of the Rule states: *In a narrow channel a powerdriven vessel of less than 65 feet in length shall not hamper the safe passage of a vessel, which can navigate only inside such channel.* This means that a vessel over 65 feet—for example, a 70-foot fishing vessel—can require a monster tanker to give way in a crossing situation, according to the letter of the law, if the fishing vessel is the privileged vessel. In one part of the Malacca and Singapore Straits channels, where the water, deep enough for giant tankers is only 1.5 miles wide, such a rule presents serious potential hazards.

Although no solution has been proposed for the impasse between the "moderate speed" rule and the inability of monster tankers to comply therewith, the United Nation's Inter-Governmental Maritime Consultive Organization (IMCO) adopted in November 1968 an interim resolution which will have the effect of a Rule of the Road. The resolution prescribes that monster tankers, when navigating in narrow channels, shall show red lights similar to those shown by a vessel that is not under command. The resolution prescribes that "three red lights in a vertical line . . . shall be carried where they can best be seen and visible around the horizon at a distance of at least two miles. By day such a vessel may carry, where it can best be seen, a black cylinder of not less than two feet in diameter and a length of not less than 3.5 feet."

Since this resolution restricts itself to application only in narrow channels, how will a super tanker indicate her size when operating in other than narrow channels?



flaps similar to aerodynamic flaps on jet airplanes. The flaps extend out of the underwater body and, when not in use, retract to form a part of the ship form.

Even so, the effectiveness of the various braking devices seems to be marginal and of no appreciable effect in reducing from full speed unless used in conjunction with the main engine. In the final analysis the intelligent control of speed in congested waters and in low visibility is the only sound policy, and that will be ineffective unless sufficient astern power is built into the monster tankers.

Another area of deficiency in the Rules of the Road as they apply to the giant tankers lies with the rules which prescribe lights for vessels underway and at anchor. Rule 2 prescribes that, when underway, a white light shall be carried in the forepart of the vessel, and a second white light shall be carried abaft the forward light. The after light shall be carried at least 15 feet higher than the forward light. Owing to the design of the monster tankers, the after light is carried on the radar mast above the after superstructure. This means that there may be a distance of from 600 to 900 feet horizontally between the two white lights. It is not surprising, then, that observers in other, smaller vessels can be misled into thinking that there are two vessels involved, instead of a single ship 1,000 feet in length. An accident of this nature occurred recently in Tokyo Bay between the *Idemitsu Daphne* and a small inter-island vessel.

It has been suggested by the U. S. representative to IMCO that the adoption of a rule similar to Rule 9 of the U. S. Great Lakes Rules would be a realistic solution to the problem. The long ore carriers are required to show, when at anchor, a white light every 100 feet along the main deck. This rule was adopted on the Great Lakes in 1895, and since that time, there have been no collisions caused by an ore carrier being mistaken for two vessels.

While waiting for the International Rules of the Road to be changed to provide for 20th century ships, some masters are following the practice of commanding officers of the U. S. Coast Guard sailing barque *Eagle*, as well as many yachtsmen. When underway at night in congested waters, white flood lights are reflected off the billowing sails of the *Eagle* so that other traffic will not mistake her for a steamer. Captain Hiramatsu, the master of the Japanese gargantuan *Nisho Maru*, stated recently that when navigating in the Inland Sea of Japan, he illuminates the unlighted mid-body of his 1,000 foot vessel with a searchlight, even though such a light is not specifically provided for by the Rules of the Road, so that nearby traffic will be aware of the ship's length.

Essential, too, is the need for these huge ships to be towed so as to keep them clear of any shoal area where a grounding might occur, and separate from traffic moving on an opposite course. The only way this can be done is by the use of sea lanes. An internationally accepted regime of mandatory sea lanes across the oceans is urgently needed.

Within the past few years, the Coast Guard has established recommended sea lane systems in the approaches to New York, Delaware Bay, and San Francisco, and in the Santa Barbara Channel. Sea lane systems have also been established in the English Channel, portions of the North Sea, Baltic Sea, Strait of Gibraltar, and off the Cape of Good Hope. Since the establishment of sea lanes in the Dover Strait, collision statistics have been halved in that area.

IMCO has recognized the immediate need for separation of traffic and, in March 1969 issued a resolution concerning ship routing. The resolution recommended that all nations encourage their vessels to use sea lanes where established. Although the intent was commendable, there is serious doubt as to whether the measure goes far enough, for the resolution does not make the use of sea lanes mandatory. Whether ocean navigation can accept such an important safety concept on a vol-

question until the next disaster.

Japan, with five ports open to tankers with deep draft, has the most offshore traffic by monster tankers. Yet Japan still has not established sea lanes for her busy ports.

Sea lanes are particularly needed in the Straits of Malacca and Singapore, between the Indian and Pacific Oceans. A constant procession of tankers ply these straits on the run between the Persian Gulf and Japan. The water is deep enough for 200,000-tonners (fortot draft), but, owing to the narrow navigable width of the deep sections of the channels, large tankers must use extreme caution in traversing the area.

Traffic conditions in the Main Strait (the west part of Singapore Straits) are very heavy at times. A ship must give way to another, according to International Rules of the Road, regardless of her size. And during the fishing season, fishing boats, at times, completely obstruct the Main Strait, leaving no clear passage, either by day or by night.

Since the gargantuan tankers, with their limited maneuvering ability, must be able to negotiate overtaking and crossing situations with smaller vessels, every aid to safe navigation that is available should be used. One such aid, which is still not being used to advantage and for which an international requirement is needed, is the bridge-to-bridge telephone.

For 27 minutes prior to the *Andrea Doria-Stockholm* collision in 1957, the two vessels had been in sight of each other, yet the deck officers on the respective bridges could not communicate with each other because there were no radio-telephones installed. At the same time, passengers on both ships, a few feet above the bridges, were using radiotelephones for personal calls to the shore. A Congressional committee investigating that accident recommended that a bridge-to-bridge radiotelephone communication system be adopted on

"The world's seaborne trade has nearly doubled in the last decade. In 1965, there were 43,000 ships of 100 gross tons or greater, and by the year 2000, this number may well be 88,000. This figure could include as many as 2,000 monster tankers.

It has now been three years since the *Torrey Canyon* disaster, and the lack of definitive international requirements for mandatory use of sea lanes, bridge-to-bridge communication, and practical changes to the Rules of the Road poses a stark question. Is the international maritime legal machinery too cumbersome to cope with the changing needs of 20th century ocean traffic? And that question prompts another, of even graver significance. Will it take another, greater maritime disaster to awaken the world to the urgent need for realistic international regulation of ocean navigation?